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(71) Applicant: **Getac Technology Corporation**
New Taipei City (TW)

(72) Inventor: **KUO, Hsiu-Yu**
11568 Taipei City (TW)

(74) Representative: **Viering, Jentschura & Partner mbB**
Patent- und Rechtsanwälte
Am Brauhaus 8
01099 Dresden (DE)

(54) CONNECTOR PLUG, ABUTTING STRUCTURE OF THE SAME, AND ELECTRICAL CONNECTION MECHANISM HAVING THE SAME

(57) A connector plug, abutting structure of the same, and electrical connection mechanism having the same are provided. The connector plug includes a connection body and an outer casing member. The outer casing member is disposed outside the connection body and includes an inner casing and an outer casing enclosing the inner casing. At least one engaging arm is disposed on the inner casing and has a pressing portion protruding from the outer casing and an engaging portion extending forward from the pressing portion and hanging on the sidewall of an insertion port of the connection body. At least one engaging hole is defined on a receptacle. When a plug is plugged into the receptacle, the engaging portion becomes engaged with the engaging hole to achieve connection.

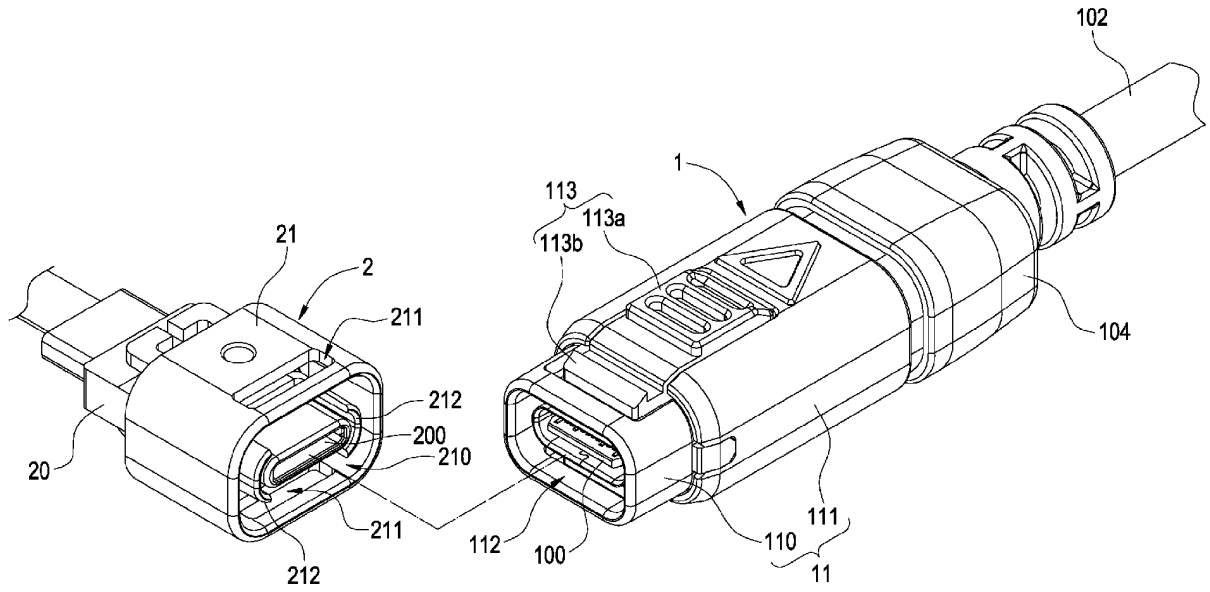

FIG.1

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Description

[0001] The application claims priority to U.S. Provisional Application No. 63/226,543, filed on July 28, 2021, the disclosure of which is hereby incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0002] The present disclosure relates to connectors and, more particularly, to a connector plug, an abutting structure of a connector plug, and an electrical connection mechanism having a connector plug.

DESCRIPTION OF THE PRIOR ART

[0003] To prevent glitches, such as a loosened connector otherwise required for signal or data transmission, conventional industrial computers applicable to vehicles or operating in compliance with special standards or military standards, usually come with a specially-designed connector plugging structure, albeit limiting the scope of their application because of an eclectic mix of specifications.

[0004] Universal specification, such as USB Type-C specification, is conveniently available to conventional connectors but render it difficult to alter the plugging structures of the conventional connectors for use with the industrial computers in accordance with their stringent usage requirements. In view of this, the present disclosure provides an external reinforcement structure conducive to the application of connectors with universal specification to the aforesaid scenarios which have stringent usage requirements.

[0005] The present disclosure is further designed to ensure the abutting firmness of connectors.

SUMMARY OF THE INVENTION

[0006] It is an objective of the present disclosure to provide a connector plug, an abutting structure of a connector plug, and an electrical connection mechanism having a connector plug, all adapted to achieve structural reinforcement of connector casings while keeping their universal specification intact, and characterized by an engagement design whereby an abutting structure can be firmly fastened in place in the course of plugging, so as to prevent detachment of connectors in the course of male-female plugging.

[0007] Another objective of the present disclosure is to provide a connector plug, an abutting structure of a connector plug, and an electrical connection mechanism having a connector plug, which comply with universal specification, such as USB Type-C specification.

[0008] In order to achieve the above and other objectives, the present disclosure provides a connector plug, comprising a connection body and an outer casing member. The connection body has a connector and a terminal member extending to a terminal end of the connector. The terminal member comprises a cable electrically connected to the connector and a sheath portion enclosing the cable. The outer casing member comprises an inner casing and an outer casing enclosing the inner casing. The inner casing fits to the sheath portion from outside. A circular sidewall at a front end of the inner casing defines an insertion port. The insertion port protrudes from a front end of the outer casing when the connector protrudes from a front end of the sheath portion and reaches an interior of the insertion port. At least one engaging arm is disposed on the inner casing and has a pressing portion protruding from the outer casing and an engaging portion extending forward from the pressing portion and hanging above a sidewall of the insertion port.

[0009] In order to achieve the above and other objectives, the present disclosure provides an abutting structure of a connector plug, comprising a plug and a receptacle. The plug comprises a connection body and an outer casing member disposed outside the connection body. The outer casing member further comprises an inner casing and an outer casing enclosing the inner casing. A circular sidewall at a front end of the inner casing defines an insertion port. At least one engaging arm is disposed on the inner casing and has a pressing portion protruding from the outer casing and an engaging portion protruding forward from the pressing portion and hanging above the sidewall of the insertion port. The receptacle comprises an abutting body and an abutting outer casing. The abutting outer casing has an insertion opening. The sidewall of the inner casing is inserted into the insertion opening, and the abutting body reaches the interior of the insertion opening, wherein the abutting outer casing has at least one engaging hole. The abutting outer casing has at least one engaging hole. The engaging portion becomes engaged with the engaging hole as the connection body is inserted into the abutting body.

[0010] In order to achieve the above and other objectives, the present disclosure provides an electrical connection mechanism having a connector plug and comprising a cable and a plug. The plug is disposed at one end of the cable and comprises a connection body electrically connected to the cable and an outer casing member disposed outside the connection body. The outer casing member comprises an inner casing and an outer casing enclosing the inner casing. A circular sidewall at a front end of the inner casing defines an insertion port. At least one engaging arm is disposed on the inner casing and has a pressing portion protruding from the outer casing and an engaging portion extending forward from the pressing portion and hanging above the sidewall of the insertion port.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

FIG. 1 is an exploded view of a plug and a receptacle of the present disclosure.

FIG. 2 is an exploded view of the plug of the present disclosure.

FIG. 3 is an exploded view of the receptacle of the present disclosure.

FIG. 4 is a cross-sectional view of the receptacle and the plug plugged thereinto according to the present disclosure.

FIG. 5 is a cross-sectional view of the receptacle and plug separated from each other according to the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0012] Technical features of the present disclosure are depicted by accompanying drawings and described below. However, the accompanying drawings are illustrative rather than restrictive of the present disclosure.

[0013] Referring to FIG. 1, there is shown an exploded view of a plug and a receptacle of the present disclosure. The present disclosure provides a connector plug, an abutting structure of the same, and an electrical connection mechanism having the same. A connector plug 1 is plugged into a receptacle 2. Referring to FIG. 2, the connector plug 1 comprises a connection body 10 and an outer casing member 11 disposed outside the connection body 10.

[0014] The connection body 10 has a connector 100 and a terminal member 101 extended to the terminal end of the connector 100. In an embodiment of the present disclosure, the connector 100 of the connector plug 1 is a connector with universal specification, such as USB Type-C specification, and is a female end of the specification. The terminal member 101 comprises a cable 102 electrically connected to the connector 100 of the connector plug 1 and a sheath portion 103 enclosing the cable 102. The electrical connection mechanism of the present disclosure is constructed by providing the connector plug 1 at one end of the cable 102, with the cable 102 electrically connected to the connection body 10. Depending on product needs, either connectors (not shown) with identical or different specifications are disposed at the other end of the cable 102, or the other end of the cable 102 is directly connected to a required apparatus (not shown).

[0015] The outer casing member 11 comprises an inner casing 110 and an outer casing 111 enclosing the inner casing 110. The inner casing 110 fits to the sheath portion 103 of the connection body 10 from outside. The front end of the inner casing 110 has an insertion port 112 protruding from the front end of the outer casing 111. The insertion port 112 is an opening formed by a circular sidewall of the inner casing 110. The connector 100 of the connector plug 1 protrudes from the front end of the sheath portion 103 to thereby reach the interior of the insertion port 112.

[0016] Referring to FIG. 1 and FIG. 3, the receptacle 2 comprises an abutting body 20 and an abutting outer casing 21. The abutting body 20 has a connector 200 with universal specification, such as Type-C specification or the like. The connector 200 enables the connector plug 1 to achieve electrical connection. The abutting outer casing 21 has an insertion opening 210. The abutting body 20 is adapted to enter the insertion opening 210 smoothly in a way facilitated by the outline of the anterior sidewall of the inner casing 110 of the connector plug 1, so as to achieve the electrical connection of the connector 200 of the receptacle 2 and the connector 100 of the connector plug 1.

[0017] As shown in FIG. 1 and FIG. 4, the present disclosure is advantageous in that at least one engaging arm 113 is disposed on the inner casing 110 of the connector plug 1. The engaging arm 113 has a pressing portion 113a protruding upward from the outer casing 111 and an engaging portion 113b extending forward from the pressing portion 113a and hanging above the sidewall of the insertion port 112. At least one engaging hole 211 is disposed on the abutting outer casing 21 of the receptacle 2 and corresponds in position to the engaging portion 113b of the engaging arm 113; thus, the engaging portion 113b becomes engaged with the engaging hole 211 as the connector 100 of the connector plug 1 is inserted into the connector 200 of the receptacle 2. As shown in FIG. 2, a groove is defined on the sidewall of the insertion port 112 and adapted to hang the engaging portion 113b. The groove is of a length which can be increased according to the position of the pressing portion 113a and can be designed according to the pressing depth of the pressing portion 113a. Referring to FIG. 4, at least one channel 103a is arranged on the sheath portion 103 and corresponds in position to the pressing portion 113a from below, thereby increasing the room for pressing the pressing portion 113a downward. Referring to FIG. 3, two guide portions 212 are disposed in the insertion opening 210 of the abutting outer casing 21 of the receptacle 2 and correspond in position to two sides of the connector 200 of the receptacle 2, respectively, to facilitate the alignment and guidance required for the insertion of the connector 100 of the connector plug 1.

[0018] Referring to FIG. 5, to unplug the connector plug 1 from the receptacle 2, a user presses the pressing portion 113a of the engaging arm 113, for example, by hand, to exert a force on the engaging arm 113 and thereby allow the engaging portion 113b to bend inward, deform and separate from the engaging hole 211. It is possible to increase the number of the engaging arm 113. As shown in FIG. 2, in an embodiment of the present disclosure, the engaging arms 113 are in the number of two and are disposed on two opposite sidewalls of the insertion port 112, respectively; and, as shown in FIG. 3, the engaging holes 211 are also in the number of two and are disposed at corresponding positions, respectively.

[0019] Referring to FIG. 2, in an embodiment of the present disclosure, to couple the inner casing 110 and the outer casing 111 of the connector plug 1 together,

the inner casing 110 is inserted into the front end of the outer casing 111, whereas the front edge of the outer casing 111 dents to form a notch 111a corresponding in position to the pressing portion 113a of the engaging arm 113, such that the pressing portion 113a becomes received in the notch 111a as the inner casing 110 is inserted into the front end of the outer casing 111. An engaging aperture 111b is defined at each of the two ends of the front edge of the outer casing 111 and corresponds in position to a bump 110c disposed at the inner casing 110. Upon insertion of the inner casing 110 into the front end of the outer casing 111, the bumps 110c engagingly enter the engaging apertures 111b, respectively, such that the inner casing 110 and the outer casing 111 are coupled together more firmly.

[0020] Referring to FIG. 1 and FIG. 2, in addition to the aforesaid technical features of the electrical connection mechanism of the present disclosure, the cable 102 has a buffer structure 104 located at the terminal end of the outer casing member 11 of the connector plug 1; the buffer structure 104 is made by plastic injection molding and disposed between the cable 102 and the terminal end of the sheath portion 103; an inner link ring 110d is disposed at the terminal end of the inner casing 110; an outer link ring 111c is disposed at the terminal end of the outer casing 111; after the inner casing 110 and the outer casing 111 have been coupled together, the outer link ring 111c is fitted to the inner link ring 110d, allowing the outer link ring 111c to be coupled to the front edge of the buffer structure 104.

[0021] Therefore, given the aforesaid technical features, it is feasible to implement the connector plug, abutting structure of the same, and electrical connection mechanism having the same according to the present disclosure.

[0022] In conclusion, the present disclosure achieves anticipated objectives of use and overcomes drawbacks of prior art. Furthermore, the present disclosure has novelty and inventiveness and thus meets patentability requirements. Therefore, a patent application is filed according to the Patent Act, and granting the application with patent rights is respectfully requested to ensure rights of the Inventor.

[0023] The present disclosure is disclosed above by preferred embodiments. However, persons skilled in the art should understand that the preferred embodiments are illustrative of the present disclosure only, but shall not be interpreted as restrictive of the scope of the present disclosure. Hence, all equivalent changes made to the aforesaid embodiments shall fall within the scope of the present disclosure. Accordingly, the legal protection for the present disclosure shall be defined by the appended claims.

Claims

1. A connector plug, comprising:

a connection body having a connector and a terminal member extending to a terminal end of the connector, and the terminal member comprising a cable electrically connected to the connector and a sheath portion enclosing the cable; and

an outer casing member comprising an inner casing and an outer casing enclosing the inner casing, the inner casing fitting to the sheath portion from outside, wherein a circular sidewall at a front end of the inner casing defines an insertion port, wherein the insertion port protrudes from a front end of the outer casing when the connector protrudes from a front end of the sheath portion and reaches an interior of the insertion port,

wherein at least one engaging arm is disposed on the inner casing and has a pressing portion protruding from the outer casing and an engaging portion extending forward from the pressing portion and hanging above a sidewall of the insertion port.

2. The connector plug of claim 1, wherein the connector complies with Type-C specification.

3. The connector plug of claim 1, wherein the sheath portion has thereon at least one slot, such that the inner casing is engaged with the slot and thereby fitted to the sheath portion from outside.

4. The connector plug of claim 1, wherein a front edge of the outer casing dents to form a notch for receiving the pressing portion.

5. The connector plug of claim 1, wherein the engaging arms are in the number of two and are disposed on the two opposite sidewalls of the insertion port, respectively.

6. The connector plug of claim 1, wherein a sidewall of the insertion port has a groove which the engaging portion hangs at.

7. An abutting structure of a connector plug, comprising:

a plug comprising a connection body and an outer casing member disposed outside the connection body, the outer casing member further comprising an inner casing and an outer casing enclosing the inner casing, wherein a circular sidewall at a front end of the inner casing defines an insertion port, wherein at least one engaging arm is disposed on the inner casing and has a pressing portion protruding from the outer casing and an engaging portion protruding forward from the pressing portion and hanging above the sidewall of the insertion port; and

a receptacle comprising an abutting body and an abutting outer casing, the abutting outer casing having an insertion opening, wherein the sidewall of the inner casing is inserted into the insertion opening, and the abutting body reaches an interior of the insertion opening, wherein the abutting outer casing has at least one engaging hole,
wherein the engaging portion becomes engaged with the engaging hole as the connection body is inserted into the abutting body.

8. The abutting structure of a connector plug according to claim 7, wherein the plug and the receptacle each have a connector which complies with Type-C specification.

9. The abutting structure of a connector plug according to claim 1, wherein two guide portions are disposed in the insertion opening of the abutting outer casing and correspond in position to two sides of the connector of the plug, respectively.

10. An electrical connection mechanism having a connector plug, comprising:

a cable; and
a plug disposed at an end of the cable and comprising a connection body electrically connected to the cable and an outer casing member disposed outside the connection body, the outer casing member comprising an inner casing and an outer casing enclosing the inner casing, wherein a circular sidewall at a front end of the inner casing defines an insertion port,
wherein at least one engaging arm is disposed on the inner casing and has a pressing portion protruding from the outer casing and an engaging portion extending forward from the pressing portion and hanging above the sidewall of the insertion port.

11. The electrical connection mechanism having a connector plug according to claim 10, wherein the cable has a buffer structure located at a terminal end of the outer casing member.

12. The electrical connection mechanism having a connector plug according to claim 10, wherein the connection body has a connector and a terminal member extending to a terminal end of the connector, wherein the terminal member comprises the cable and a sheath portion enclosing the cable.

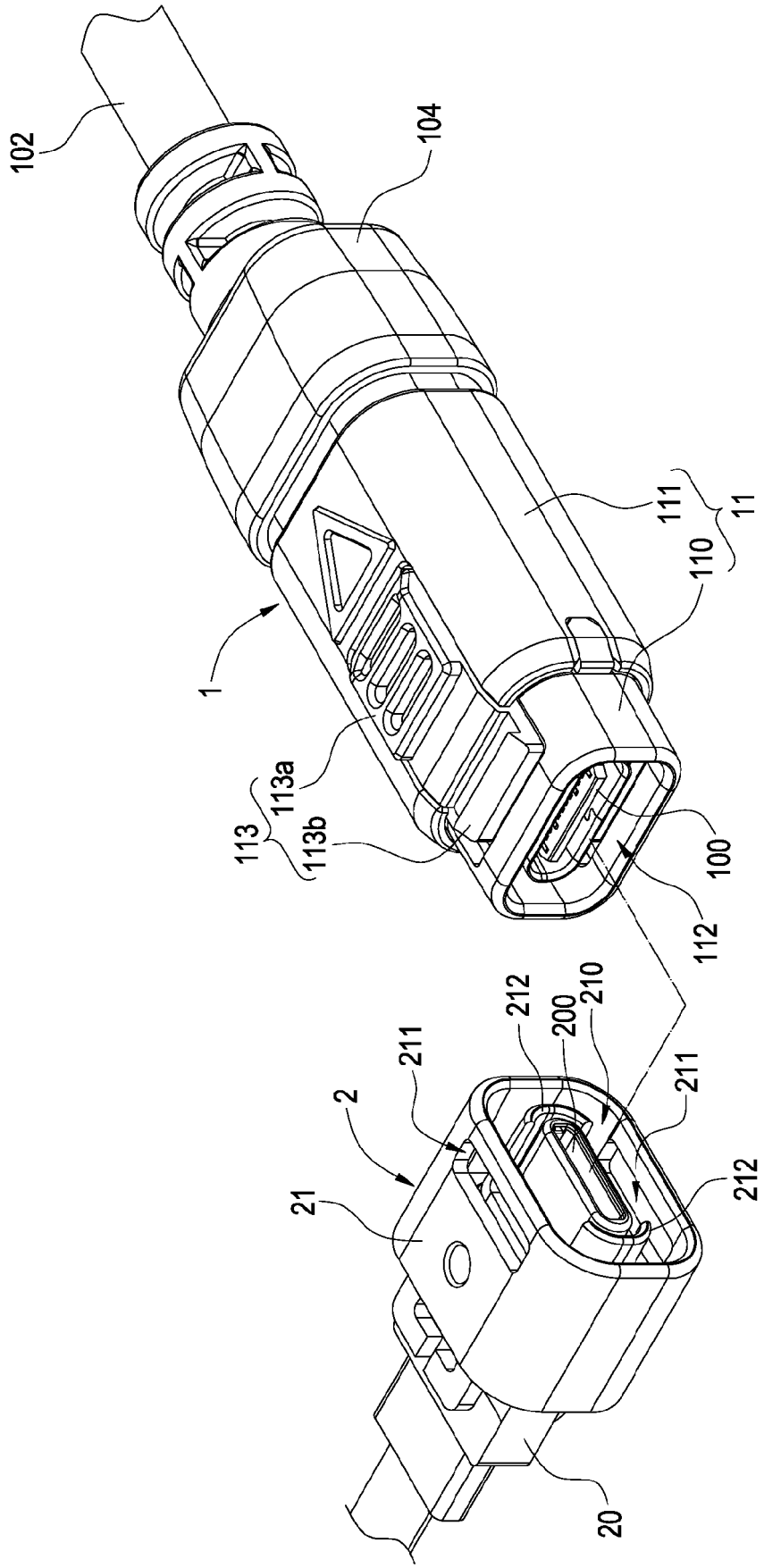
13. The electrical connection mechanism having a connector plug according to claim 12, wherein the connector complies with Type-C specification.

14. The electrical connection mechanism having a connector plug according to claim 12, wherein the sheath portion has thereon at least one slot, such that the inner casing is engaged with the slot and thereby fitted to the sheath portion from outside.

15. The electrical connection mechanism having a connector plug according to claim 10, wherein a front edge of the outer casing dents to form a notch for receiving the pressing portion.

16. The electrical connection mechanism having a connector plug according to claim 10, wherein the engaging arms are in the number of two and are disposed on the two opposite sidewalls of the insertion port, respectively.

17. The electrical connection mechanism having a connector plug according to claim 10, wherein a sidewall of the insertion port has a groove which the engaging portion hangs at.


102
104
111
11
110
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113a
113
113b
100
112
212
200
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211
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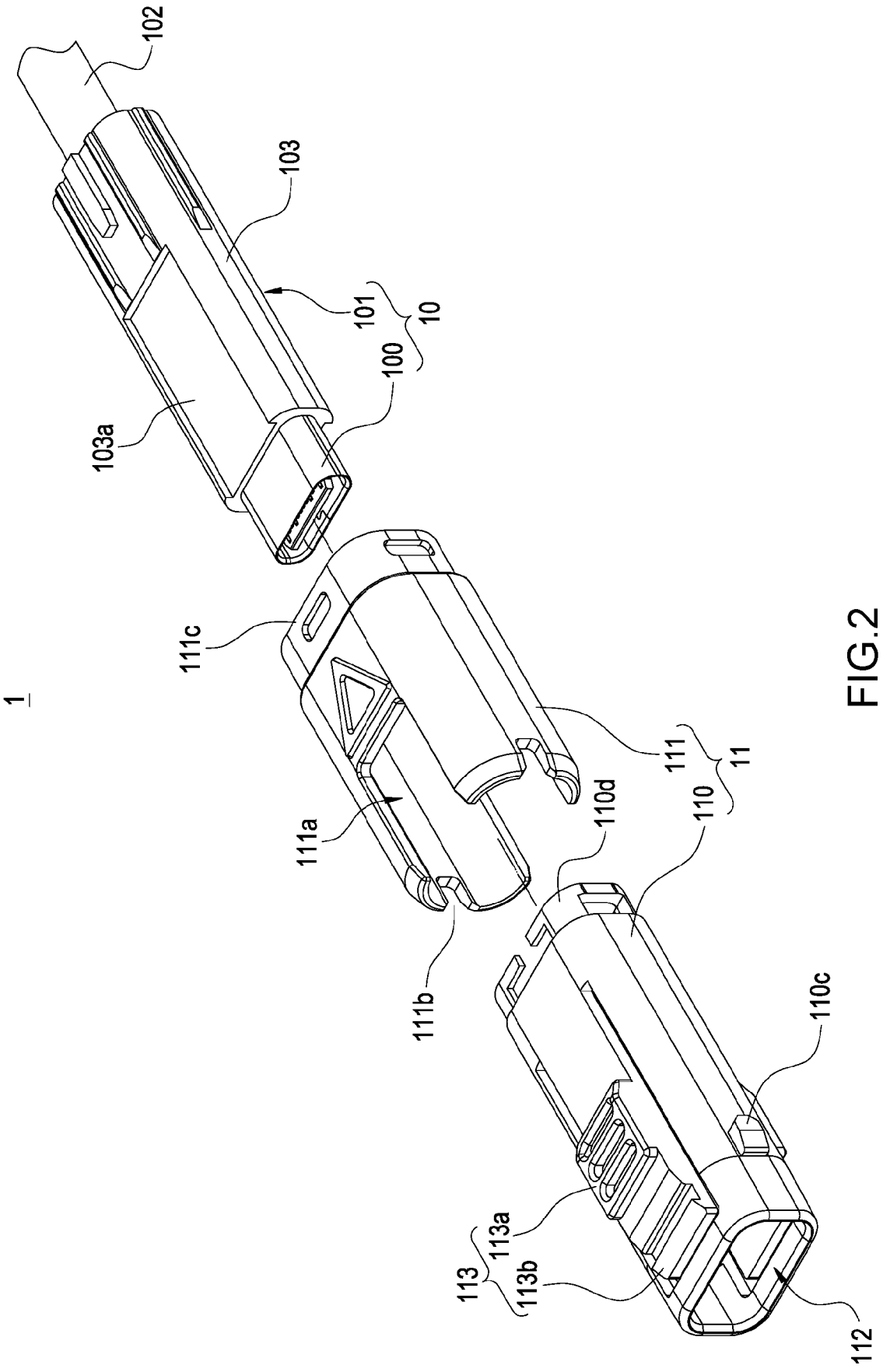
20

FIG.1


1
102
103
101
10
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103a
111c
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111b
111
11
110d
110
110c
113a
113
113b
112

FIG.2

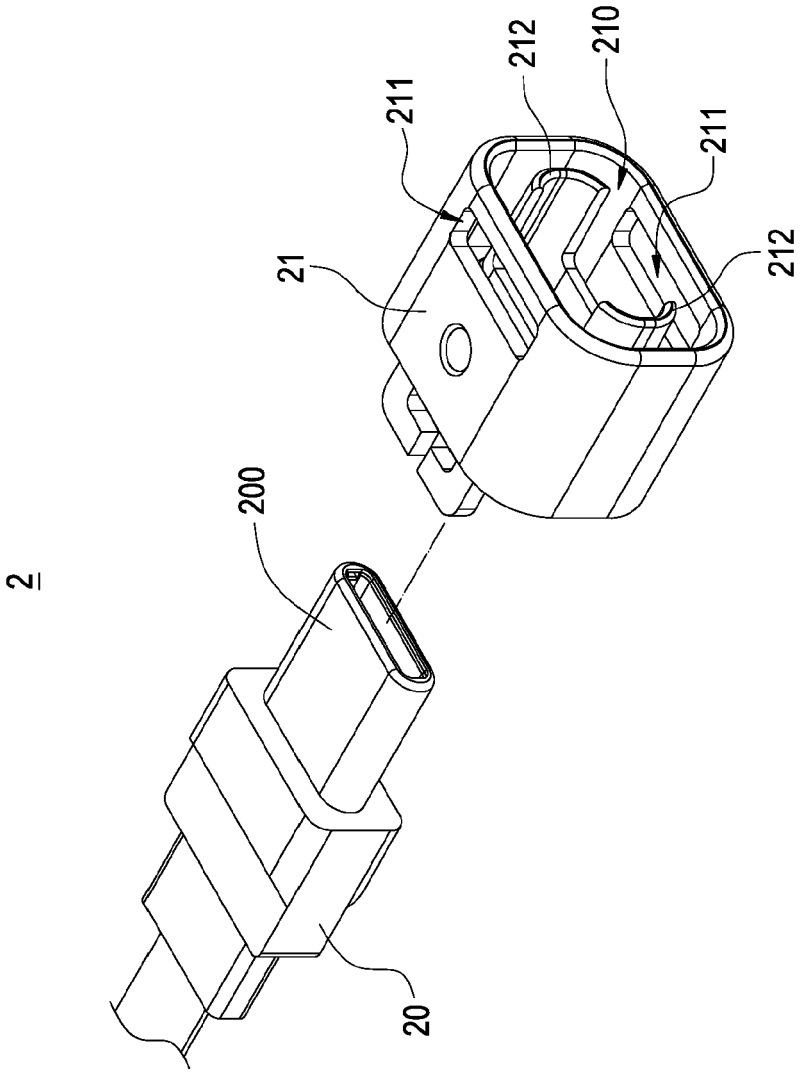
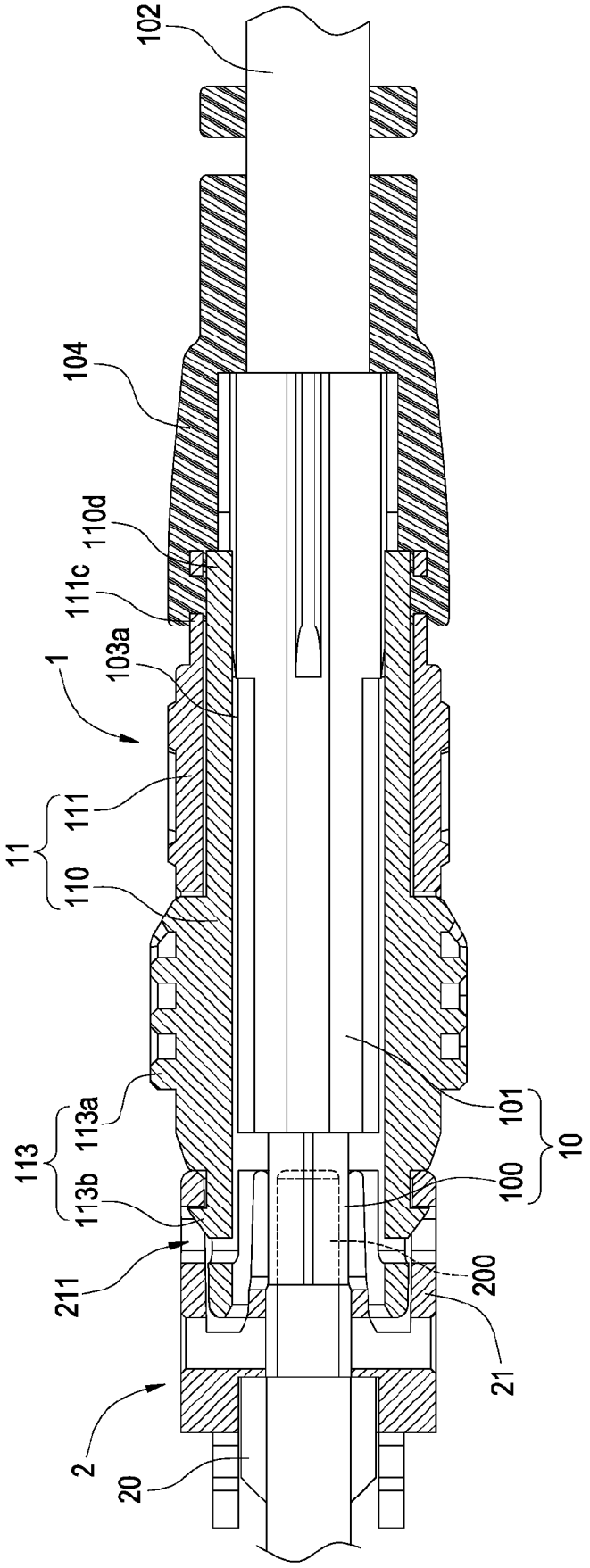


FIG.3


102
104
110d
111c
103a
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113a
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21

FIG.4

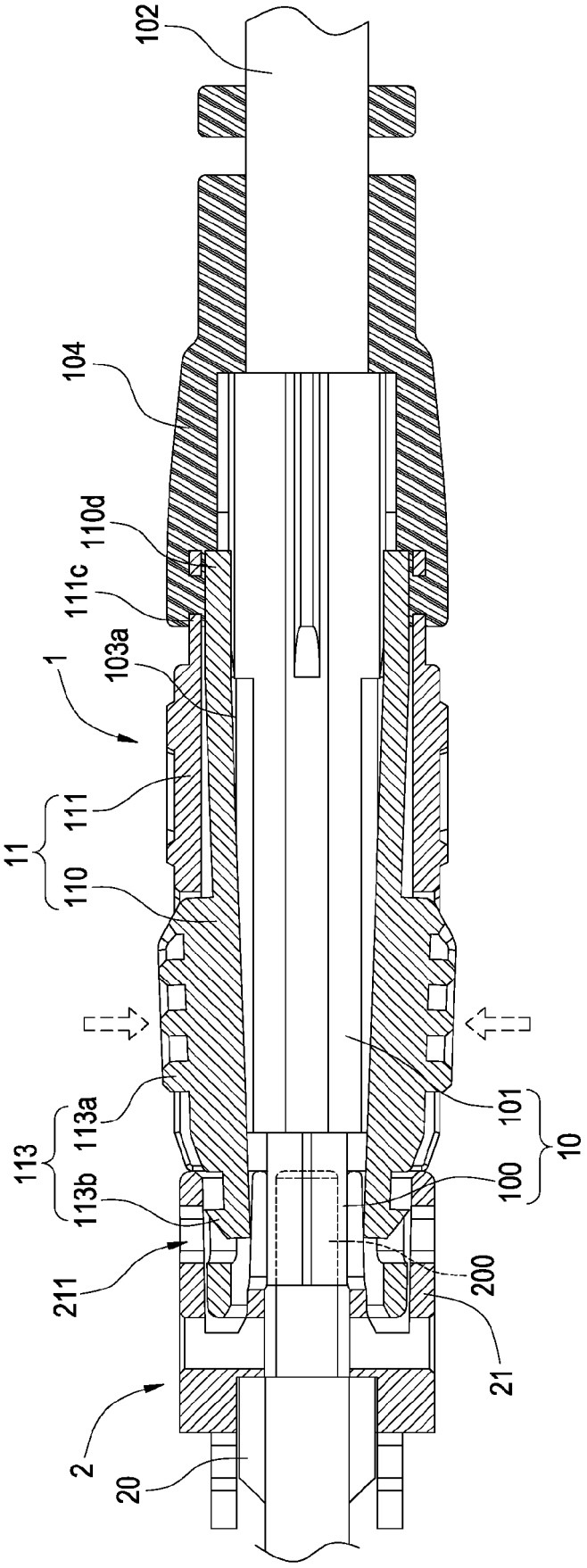
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FIG.5

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PARTIAL EUROPEAN SEARCH REPORT

under Rule 62a and/or 63 of the European Patent Convention. This report shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number
EP 22 18 7225

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2009/068904 A1 (SATO TAKESHI [JP] ET AL) 12 March 2009 (2009-03-12) * paragraphs [0030] - [0039]; figures *	1-3,5	INV. H01R13/627 H01R13/506 H01R13/516
X	US 2020/274278 A1 (KAMEYAMA ISAO [JP] ET AL) 27 August 2020 (2020-08-27) * paragraphs [0025], [0035] - [0038]; figures *	1-5	
X	CN 208 045 870 U (HUAIAN FUYV ELECTRIC TECH CO LTD; FOXCONN INTERCONNECT TECHNOLOGY LTD) 2 November 2018 (2018-11-02) * Description, section "Detailed ways"; figures *	1-3,6	
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A	US 2020/076128 A1 (YOSHIDA TAKATO [JP] ET AL) 5 March 2020 (2020-03-05) * paragraphs [0029] - [0031], [0051] - [0055]; figures *	1,3,5,6	TECHNICAL FIELDS SEARCHED (IPC) H01R

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search	Date of completion of the search	Examiner
The Hague	2 March 2023	Gélébart, Yves

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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INCOMPLETE SEARCH
SHEET C

Application Number
EP 22 18 7225

Claim(s) completely searchable:
1-6

Claim(s) not searched:
7-17

Reason for the limitation of the search:

The search has been restricted to the subject-matter indicated by the applicant in their letter of 19.01.2023 filed in reply to the invitation pursuant to Rule 62a(1) EPC.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 18 7225

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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02-03-2023

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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